



The current spectrum and prevalence of intestinal parasitosis in Campania (region of southern Italy) and their relationship with migration from endemic countries



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SUMMARY

Background: In Italy, the current clinical–epidemiological features of intestinal parasitosis and the impact of recent massive migration flows from endemic areas on their distribution are not very well known.

Methods: An analysis was carried out involving 1766 patients (720 natives and 1046 immigrants) observed during the period 2009–2010 (the 'current group') and 771 native patients observed during the period 1996–1997 (the 'historical group'), a time at which immigration in the area was minimal. Patients were analyzed for intestinal parasitosis at four healthcare centres in Campania.

Results: A wide variety of intestinal parasites was detected in the study subjects. Immigrants had a significantly higher prevalence of parasitosis and multiple simultaneous infections than natives in both groups. In both study groups of natives, the detection of at least one parasite was significantly associated with a history of travel to endemic areas. Among immigrants, we found an inverse correlation between the frequency of parasite detection and the amount of time spent in Italy. No circulation of parasites was found among contacts of parasitized patients.

Conclusions: Intestinal parasites are still a cause of intestinal infection in Campania. Although immigrants have a significantly higher prevalence of parasitosis than natives, this does not increase the risk of infection for that population. This is likely due to the lack of suitable biological conditions in our area.

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1. Introduction

Intestinal parasites represent a major public health problem in developing countries. In 2004, the World Health Organization (WHO) estimated that 3.5 billion people, mostly in tropical and sub-tropical areas of the world, were infected with intestinal parasites, and that 450 million people, mainly children, had evidence of related disease.¹

Most parasites are ubiquitous, and until a few decades ago, Italy was also considered to be an endemic area for some of them. Indeed, before the year 2000, different studies reported the circulation of numerous protozoa and helminths in our country (e.g. *Entamoeba histolytica*, *Giardia duodenalis*, *Dientamoeba fragilis*, *Trichuris trichiura*, *Strongyloides stercoralis*, *Ancylostoma duodenale*, *Ascaris lumbricoides*, *Hymenolepis nana*, *Taenia saginata*/*Taenia solium*, *Echinococcus granulosus*, and *Enterobius vermicularis*), some of which are associated with major illnesses.^{2–5}

The current opinion is that the incidence of intestinal parasitosis in Italy is low, with only sporadic cases identified, while the occurrence of disease outbreaks represents a rare event.

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However, since the reporting of most intestinal parasitosis is not mandatory in Italy, there is little information on recent clinical–epidemiological features.^{6–9} Furthermore, there are no data concerning the impact that massive migration flows during the last two decades, mostly from endemic areas such as Africa and southern Asia, may have had on the distribution of intestinal parasitosis in Italy. Indeed, a prevalence of intestinal parasites ranging from 20% to 60% has been reported in immigrants, depending on the country of origin and difficulties encountered during the migrant's travel, with the highest prevalence rates observed in those recently migrated and in those coming from Sub-Saharan Africa.^{10–18}

Since, at present, immigrants represent 8% of the Italian population,¹⁹ it might be justified to assume that a high prevalence of chronic carriers of intestinal parasites among immigrants could result in an increase in the circulation and transmission of these infectious agents.

The aim of this study was to investigate the prevalence and the spectrum of current intestinal parasites in Campania, a region of southern Italy, and to assess the potential epidemiological consequences of migration from endemic countries to this region. Campania is the second most populous (5 769 750 inhabitants) and the most densely populated region of Italy (428 inhabitants/km²).²⁰ The population of Campania region includes a not negligible percentage of immigrants, estimated to be approximately 3% (200 000 individuals) of the resident population.¹⁵ In order to achieve the objective of the study, a group of patients observed during 2009–2010 including both native and immigrant people, and a group of a native patients observed in 1996–1997 (when immigration was not present yet or was minimal), were compared and analyzed for intestinal parasitosis at four healthcare centres in Campania.

2. Materials and methods

This prevalence study was conducted on two groups of patients observed during different time-periods. The first group, observed during 2009–2010, included 1776 consecutive patients (without adopting inclusion or exclusion criteria) with intestinal symptoms who were referred to a healthcare service for immigrants and the regional hospital for infectious diseases in Naples, where they were tested for intestinal parasites. Throughout this article, all patients recruited during 2009–2010 are referred to as the current patient group. Among these, 720 were native (44% female, mean age 38 ± 16 years) and 1046 were immigrants (27% female, mean age 24 ± 9 years), who were mostly from Central Africa (46%), the Indian sub-continent (23%), and North Africa (16%).

All patients showed clinical signs, mainly chronic, compatible with intestinal parasitosis (fever, bloody diarrhoea or diarrhoea, irritable bowel syndrome, anaemia, eosinophilia, itching, and dermatitis). In most of the patients, these symptoms represented the primary cause of hospitalization, while in about a third of patients, these symptoms coexisted with other pathological conditions. In particular, 96 patients were HIV-positive (54 natives and 42 immigrants) and all of them but 10 (two natives and eight immigrants) were undergoing highly active anti-retroviral therapy (HAART). The time of arrival in Italy was known for all immigrants participating in the study.

The results found in this group of patients were compared to those obtained in a group of 771 consecutive native patients (38% female, mean age 39 ± 10 years; 60 HIV-positive, of whom only eight were undergoing HAART) referred for gastrointestinal symptoms to the participating units during the period 1996–1997, when immigration was not present yet or was minimal in this area. In the present study, these 771 patients are referred to as the historical patient group.

No patient in either the current or historical group was aged less than 12 years.

In a further investigation to analyze the potential inter-human transmissibility of parasites, we studied the households of 48 parasitized immigrants, for a total of 246 subjects.

Faecal specimens collected from all patients participating in the study were analyzed through direct microscopic examination, as well as after fixation and concentration. For direct microscopic examination, 1–2 g of faecal specimen were dissolved in 1–2 ml of normal saline to show the mobile forms, if present, and with Lugol's solution for staining of nuclei and protozoa intracellular structures. Smears were prepared from samples in normal saline for staining by modified Ziehl–Neelsen method (for Coccidia), Weber method (for Microsporidia), and Giemsa colouration for protozoa. Specific fluorescent monoclonal antibodies were also used for the identification of *Cryptosporidium spp.*, *G. duodenalis*, and *E. histolytica/dispar*.²¹

For the concentration, 2–3 g of faecal specimen were fixed in 5% formalin (dilution ratio 1:4). All samples were then analyzed with the classical concentration technique of sedimentation. Moreover, flotation through the FLOTAC dual pellet 400 technique was also performed for the concentration of specimens from the current prospective group of patients, using two floating solutions (SF4: watery solution of sodium nitrate (specific weight = 1200); SF7: watery solution of zinc sulphate (specific weight = 1350)); the pellet was first treated with diethyl ether (2 ml diethyl ether + 10 ml saline solution).^{22–27} No DNA-based methods were carried out to differentiate *Entamoeba histolytica* from *E. dispar*. Because this differentiation cannot be made on a morphological basis, it was based only on clinical criteria (i.e., the presence of specific clinical patterns of intestinal amoebiasis for *E. histolytica* that are lacking for *E. dispar*, this latter species being non-pathogenic).²⁸

Only one sample per patient was available in 62% of the cases, two samples were available for 22%, and three or more samples were available for 16%, for a total of 3815 stool specimens examined. The numbers of samples were homogeneously distributed among all groups of patients.

The United Kingdom National External Quality Assessment Service (UKNEQAS; Department of Clinical Parasitology, Hospital for Tropical Diseases, London) provided specimens for faecal parasitology quality control. All samples were processed and analyzed by the same team of parasitologists.

2.1. Statistical analysis

Statistical analyses were performed using the Student's *t*-test for comparisons between means. For categorical variables, differences between groups were calculated by Chi-square test and Fisher's exact test, when necessary. A two-sided *p*-value of less than 0.05 was considered statistically significant. Analysis for linear trends in proportions was conducted using the extended Mantel–Haenszel test. All statistical analyses were performed using Stata version 11.2 (StataCorp LP, College Station, TX, USA).

The study was approved by the Ethics Committee of Cotugno Hospital. All participating patients provided signed informed consent.

3. Results

3.1. Overall prevalence of intestinal parasitosis

Considering all patient groups (current natives, current immigrants, and historical natives), a total of 1065 intestinal parasites were found in 664 patients. Most of the parasites identified were protozoa considered as non-obligate pathogens, which were often found in conjunction with pathogenic species

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